

An aerial photograph of a large dam and reservoir. In the foreground, a bridge with multiple concrete piers spans a body of water. The dam itself is a long, low structure with a series of small, rectangular openings. The reservoir is filled with water, and the surrounding landscape is hilly and sparsely vegetated. The sky is clear and blue.

APPENDIX N

METROPOLITAN COAL PROJECT ENVIRONMENTAL ASSESSMENT

APPENDIX N PRELIMINARY HAZARD ANALYSIS



HELENSBURGH COAL PTY LTD

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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
N1 INTRODUCTION	1
N1.1 OBJECTIVE AND SCOPE	1
N1.2 STUDY METHODOLOGY	2
N1.2.1 Preliminary Hazard Analysis Workshop	2
N1.2.2 Risk Management Process	2
N1.2.3 Risk Criteria	3
N1.2.4 Qualitative Measures of Consequence, Likelihood and Risk	3
N2 PROJECT OVERVIEW	4
N3 HAZARD IDENTIFICATION	5
N3.1 DESCRIPTION OF HAZARDOUS MATERIALS	5
N3.1.1 Diesel	5
N3.1.2 Petrol	5
N3.1.3 Hydrocarbons	5
N3.1.4 Liquid Petroleum Gas	6
N3.1.5 Explosives	6
N3.2 HAZARD IDENTIFICATION PROCESS	6
N3.2.1 Project Components	6
N3.2.2 Incident Classes	6
N3.2.3 Project Risk Treatment Measures	7
N4 RISK MANAGEMENT AND EVALUATION	8
N5 REFERENCES	8

LIST OF TABLES

Table N-1	Qualitative Measures of Probability
Table N-2	Qualitative Measures of Maximum Reasonable Consequence
Table N-3	Risk Ranking Table

LIST OF FIGURES

Figure N-1	Risk Management Process
Figure N-2	Project General Arrangement

ATTACHMENTS

Attachment NA	Metropolitan Coal Project Hazard Identification Table
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N1 INTRODUCTION

This Preliminary Hazard Analysis (PHA) has been conducted as part of the Environmental Assessment (EA) to evaluate the hazards associated with the Metropolitan Coal Project (the Project) in accordance with the general principles of risk evaluation and assessment outlined in the NSW Department of Urban Affairs and Planning (DUAP) *Multi-Level Risk Assessment* (DUAP, 1999). This PHA also addresses the requirements of State Environmental Planning Policy (SEPP) No. 33 (Hazardous and Offensive Development) and has been documented in general accordance with *Guidelines for Hazard Analysis: Hazardous Industry Planning Advisory Paper No. 6* (DUAP, 1992a).

Assessed risks are compared to the qualitative risk assessment criteria developed in accordance with Australian Standard/New Zealand Standard (AS/NZS) 4360:2004 *Risk Management* (AS/NZS 4360:2004). Further, this PHA considers the qualitative criteria provided in *Risk Criteria for Land Use Safety Planning: Hazardous Industry Planning Advisory Paper No. 4* (DUAP, 1992b).

Metropolitan Colliery is an underground coal mining operation located approximately 30 kilometres (km) north of Wollongong in New South Wales (NSW). The Metropolitan Colliery is owned and operated by Helensburgh Coal Pty Ltd (HCPL), a wholly owned subsidiary of Peabody Pacific Pty Limited.

The proposed Project would involve the continuation of underground mining operations at the Metropolitan Colliery. The area of proposed underground mining is situated to the west and north of the current longwall mining areas. The Project would extend the life of the Metropolitan Colliery by approximately 25 years.

Existing surface and underground facilities at the Metropolitan Colliery (e.g. conveyors, ventilation equipment and service infrastructure) would be used to service the Project. However, some new facilities and/or modifications to existing infrastructure would be required to support the ongoing mining activities and the proposed increase in mine production. A description of the Project is provided in Section 2 of the Main Report of the EA.

N1.1 OBJECTIVE AND SCOPE

The objective of this PHA is to identify the risks posed by the Project to people, property and the environment and assess the identified risks using applicable qualitative criteria. This assessment considers off-site risks to people, property and the environment (in the presence of controls) arising from atypical and abnormal hazardous events and conditions (i.e. equipment failure, operator error and external events). The assessment does not consider risks to HCPL employees or property.

This report should be read in conjunction with the following studies conducted for the EA:

- Subsidence Assessment (Appendix A).
- Groundwater Assessment (Appendix B).
- Surface Water Assessment (Appendix C).
- Aquatic Ecology Assessment (Appendix D).
- Baseline Flora Survey (Appendix E).
- Terrestrial Vertebrate Fauna Survey (Appendix F).
- Terrestrial Flora and Fauna Impact Assessment (Appendix G).
- Aboriginal Cultural Heritage Assessment (Appendix H).
- Non-Aboriginal Heritage Assessment (Appendix I).
- Noise Impact Assessment (Appendix J).
- Air Quality Impact Assessment (Appendix K).

- Traffic Assessment (Appendix L).
- Socio-Economic Assessment (Appendix M).
- Environmental Risk Assessment (ERA) and Compatibility Study (Appendix O).

N1.2 STUDY METHODOLOGY

The methodology employed during the preparation of this PHA was as follows:

- (i) Identify the hazards associated with the Project.
- (ii) Examine the maximum reasonable consequence¹ of identified events.
- (iii) Qualitatively estimate the likelihood of events.
- (iv) Propose risk treatment measures.
- (v) Qualitatively assess risks to the environment, members of the public and their property arising from atypical and abnormal events and compare these to applicable qualitative criteria.
- (vi) Recommend further risk treatment measures if considered warranted.
- (vii) Qualitatively determine the residual risk assuming the implementation of the risk treatment measures.

N1.2.1 Preliminary Hazard Analysis Workshop

The above methodology was implemented during a PHA workshop on 7 April 2008. The workshop participants (i.e. the risk assessment team) included technical advisors from HCPL including:

- HCPL General Manager – Corporate and Operations Support; and
- HCPL Technical Services Manager.

Representatives of Resource Strategies Pty Ltd facilitated the workshop.

N1.2.2 Risk Management Process

This PHA has been undertaken with regard to the risk management process described in AS/NZS 4360:2004 *Risk Management*. The risk management process is shown schematically on Figure N-1 and includes the following components:

- Establish the context – Section N1.2.4.
- Identify risks – Section N3.2 and Attachment NA.
- Analyse risks – Section N4 and Attachment NA.
- Evaluate risks – Section N4 and Attachment NA.
- Treat risks – Section N3.2.3 and Attachment NA.

¹ Definition of Maximum Reasonable Consequence – The worst-case consequence that could reasonably be expected, given the scenario and based upon the experience of the workshop participants.

N1.2.3 Risk Criteria

This PHA considered the following qualitative criteria (summarised from DUAP, 1992b):

- (a) All 'avoidable' risks should be avoided. This necessitates investigation of alternative locations and technologies where applicable.
- (b) The risks from a major hazard should be reduced wherever practicable, irrespective of the value of the cumulative risk level from the whole installation.
- (c) The consequences (effects) of the more likely hazardous events should, wherever possible be contained within the boundaries of the installation.
- (d) Where there is an existing high risk from a hazardous installation, additional hazardous developments should not be allowed if they add significantly to that existing risk.

N1.2.4 Qualitative Measures of Consequence, Likelihood and Risk

To undertake a qualitative risk assessment it is useful to define (in a descriptive sense) the various levels of consequence of a particular event, and the likelihood (or probability) of such an event occurring. Risk assessment criteria were developed in accordance with AS/NZS 4360:2004 which allows the risk assessment team to develop risk criteria during the establish the context phase.

In accordance with AS/NZS 4360:2004, Tables N-1, N-2 and N-3 were reviewed by the PHA workshop team (Section N1.2.1) at the commencement of the workshop as part of establishing the context. The tables were considered to be consistent with the specific objectives and context of the PHA.

Table N-1
Qualitative Measures of Probability

Event	Likelihood	Description
A	Almost Certain	Happens often
B	Likely	Could easily happen
C	Possible	Could happen and has occurred elsewhere
D	Unlikely	Hasn't happened yet but could
E	Rare	Conceivable, but only in extreme circumstances

Source: Safe Production Solutions (2007)

Table N-2
Qualitative Measures of Maximum Reasonable Consequence

	People	Environment	Asset/Production
1	Multiple fatalities	Extreme environmental harm (e.g. widespread catastrophic impact)	More than \$5M loss or production delay
2	Permanent total disabilities, single fatality	Major environmental harm (e.g. widespread substantial impact)	\$1M to \$5M loss or production delay
3	Major injury or health effects (e.g. major lost workday case/permanent disability)	Serious environmental harm (e.g. widespread and significant impact)	\$500k to \$1M loss or production delay
4	Minor injury or health effects (e.g. restricted work or minor lost workday case)	Material environmental harm (e.g. localised and significant impact)	\$50k to \$500k loss or production delay
5	Slight injury or health effects (e.g. first aid/minor medical treatment level)	Minimal environmental harm (e.g. interference or likely interference to an environmental value)	Less than \$50k loss or production delay

Source: Safe Production Solutions (2007)

Combining the probability and consequence, Table N-3 provides a qualitative risk analysis matrix to assess risk levels.

**Table N-3
Risk Ranking Table**

		Probability				
		A	B	C	D	E
Consequence	1	1 (H)	2 (H)	4 (H)	7 (M)	11 (M)
	2	3 (H)	5 (H)	8 (M)	12 (M)	16 (L)
	3	6 (H)	9 (M)	13 (M)	17 (L)	20 (L)
	4	10 (M)	14 (M)	18 (L)	21 (L)	23 (L)
	5	15 (M)	19 (L)	22 (L)	24 (L)	25 (L)

Notes: L – Low, M – Moderate, H – High
Rank numbering: 1 – highest risk; 25 – lowest risk

Legend – Risk levels:

	Tolerable
	ALARP – As low as reasonably practicable
	Intolerable

Source: Safe Production Solutions (2007)

Risk acceptance criteria for the Project have been formulated following consideration of the *Hazardous Industry Planning Advisory Paper Number 4* (DUAP, 1992b) and AS/NZS 4360:2004 *Risk Management* guidelines, viz.:

“Qualitative Risk Acceptance Criteria:

The risk posed by an event is at a level where the residual risk levels are considered tolerable, following consideration of the proposed risk mitigation and minimisation measures.”

The hazard identification summary table (Attachment NA) illustrates the systematic application of the above criteria for the Project.

N2 PROJECT OVERVIEW

The main activities associated with development of the Project would include:

- ongoing surface and underground exploration activities in the Project underground mining area and surrounds;
- continued development of underground mining operations within existing HCPL mining and coal leases (and associated sub-leases) and two new Mining Lease Application areas (MLA 1 and MLA 2) (Figure N-2);
- upgrades of the existing mining and materials handling systems (e.g. longwall machinery and conveyors) to facilitate an increased run of mine (ROM) coal production rate (up to approximately 3.2 million tonnes per annum [Mtpa]);
- upgrades of the coal handling and preparation plant (CHPP) to facilitate increased production of washed coal (approximately 2.8 Mtpa), including the addition of a beneficiation circuit to produce a new thermal coal product;
- continued transport of coal reject to the Glenlee Washery for emplacement by Sada (with annual road movements capped at the existing maximum rate);
- continued transport of product coal by road to Coalcliff Coke Works and Corrimal Coke Works (with annual road movements capped at the existing maximum rate);
- construction of a coal reject paste backfill plant and associated coal reject stockpile, pumping, pipeline and underground delivery systems to facilitate the underground emplacement of coal reject materials as an integrated component of the longwall mining operation;

- train loading and train movements associated with the transport of product coal to Port Kembla Coal Terminal 24 hours per day and seven days per week;
- surface access within the Woronora Special Area and surrounds that is required for the environmental monitoring, management and remediation of mine subsidence;
- upgrades and/or extension of the existing supporting infrastructure systems (e.g. underground access, water management, ventilation and electrical systems) as required;
- extension of the life of the Metropolitan Colliery by approximately 25 years; and
- other associated minor infrastructure, plant, equipment and activities.

Figure N-2 illustrates the general arrangement of the Project. A description of the Project is provided in Section 2 of the Main Report of the EA.

N3 HAZARD IDENTIFICATION

N3.1 DESCRIPTION OF HAZARDOUS MATERIALS

The major potentially hazardous materials required for the Project include diesel, petrol, hydrocarbons (oils, greases, degreaser and kerosene), explosives and gas cylinders. A brief description of these materials is presented below.

N3.1.1 Diesel

Diesel is classified as a combustible liquid by AS 1940:2004 *The Storage and Handling of Flammable and Combustible Liquids* (AS 1940:2004) (Class C1) for the purposes of storage and handling but is not classified as a dangerous good by the criteria of the Australian Dangerous Goods (ADG) Code. In the event of a spill, diesel is damaging to soils and aquatic ecosystems and fires can occur if it is ignited (flash point 61-150°C).

The risks associated with the Project include diesel storage and usage. The use of diesel at the Project and the construction and operation of all fuel storage facilities would be undertaken in accordance with the requirements of AS 1940:2004.

On-site annual diesel usage would be up to approximately 1,410 kilolitres (kL) during operations (for 3.2 Mtpa ROM coal).

N3.1.2 Petrol

Petrol is classified as a flammable liquid (Class 3) by AS 1940:2004 and as such is classified as a dangerous good by the criteria of the ADG Code. On-site petrol usage would be minor. All fuel storage facilities would be constructed and operated in accordance with AS 1940:2004.

N3.1.3 Hydrocarbons

Oil is classified as a combustible liquid (Class C2) by AS 1940:2004. All hydrocarbon storage facilities would be constructed and operated in accordance with AS 1940:2004.

Waste oil would be placed in drums within a bunded area and would be collected by a licensed waste contractor for off-site disposal.

Small quantities of grease, degreaser and kerosene would also be required. Storage facilities for these hydrocarbons would be constructed and operated in accordance with the requirements of AS 1940:2004.

N3.1.4 Liquid Petroleum Gas

Liquid Petroleum Gas (LPG) is classified as a flammable gas (Class 2.1) by the ADG Code. Gas cylinders would be stored in accordance with AS/NZS 1596:2002 *The Storage and Handling of LP Gas*.

N3.1.5 Explosives

HCPL currently holds a Licence to Store Explosives issued by WorkCover NSW. Annual explosives usage would be up to approximately 5 tonnes (t) during operations (for 3.2 Mtpa ROM coal). In accordance with the requirements of the licence, explosives are stored in a purpose built magazine located at the major surface facilities area. The explosives storage has been designed and constructed in accordance with the requirements of AS 2187:1998 *Explosives - Storage, Transport and Use – Storage*.

N3.2 HAZARD IDENTIFICATION PROCESS

The Project hazard (or risk) identification summary table (Attachment NA) was formulated during the PHA workshop discussed in Section N1.2.1. It provides a summary of the potential off-site risks and hazards identified for the Project and a qualitative assessment of the risks posed.

N3.2.1 Project Components

For the purposes of hazard identification and assessment, the Project was subdivided into the following areas:

- transport to site;
- on-site storage;
- construction/development (pit top);
- construction/development (remote site);
- underground mining operations;
- coal handling and preparation (stockpiles);
- product coal transport (road);
- coal reject transport;
- product coal transport (rail);
- water management;
- exploration/monitoring activities;
- rehabilitation and remediation works (remote site); and
- other infrastructure and supporting systems.

N3.2.2 Incident Classes

The following generic classes of incident were identified:

- leaks/spills;
- fire;
- explosion; and
- theft.

Other classes of incidents identified included:

- release of noxious gases to atmosphere;
- subsidence in excess of predictions and safety factors; and
- equipment malfunction.

These incident classes were applied to the Project component areas to identify scenarios for which treatment measures were developed.

N3.2.3 Project Risk Treatment Measures

A number of hazard treatment and mitigative measures are described in existing management plans developed in accordance with the *Coal Mine Health and Safety Act, 2002* and the *Coal Mine Health and Safety Regulation, 2006* and would be revised (where necessary) for the Project, including the following:

- Underground Emergency Management Plan.
- Surface Emergency Management Plan.
- Contractor Management Plan.
- Dust Explosion Management Plan.
- Water Management Plan (WMP).
- Surface Transport Management Plan.
- Underground Transport Management Plan.
- Waste Management Plan.
- Spill Management Plan.
- Erosion and Sediment Control Plan.
- Site Security Plan.
- Subsidence Management Plan (SMP).
- Stockpile Management Plan.
- Fire and Explosion Control Management Plan.
- Fire Fighting Capability Management Plan.
- First Aid Management Plan.
- Bushfire Response Plan.

A number of hazard treatment and mitigative measures would be described in management plans for the Project which are summarised in the Statement of Commitments (Section 6) included in the main report of the Environmental Assessment.

In addition, the following hazard treatment measures would be adopted for the Project:

- **Maintenance** – Ongoing and timely maintenance of all mobile and fixed plant and equipment in accordance with the manufacturer's recommended maintenance schedule, and consistent with the maintenance schemes required by relevant standards. Only vehicles permitted to carry dangerous goods would be used for transport of hazardous materials.
- **Staff Training** – Operators and drivers would be trained and (where appropriate) licensed for their job descriptions. Only those personnel licensed to undertake skilled and potentially hazardous work would be permitted to do so.

- **Engineering Structures** – Civil engineering structures would be constructed in accordance with applicable codes, guidelines and Australian Standards.
- **Contractor Management** – All contractors employed by HCPL would be required to operate in accordance with the relevant Australian Standards, NSW Legislation and HCPL's Contractor Management Plan.
- **Storage Facilities** – Storage and usage procedures for potentially hazardous materials (i.e. fuels and lubricants) would be developed in accordance with Australian Standards and relevant legislation.

N4 RISK MANAGEMENT AND EVALUATION

Attachment NA presents a qualitative assessment of risks associated with the construction and operation of the Project. The assessment evaluates the risk of the Project impacting on the environment, members of the public and their property. Hazard treatment measures have been proposed, where required, to produce a 'low' level of risk in accordance with the risk acceptance criteria described in Section N1.2.4. Proposed treatment measures are identified in Section N3.2.3.

N5 REFERENCES

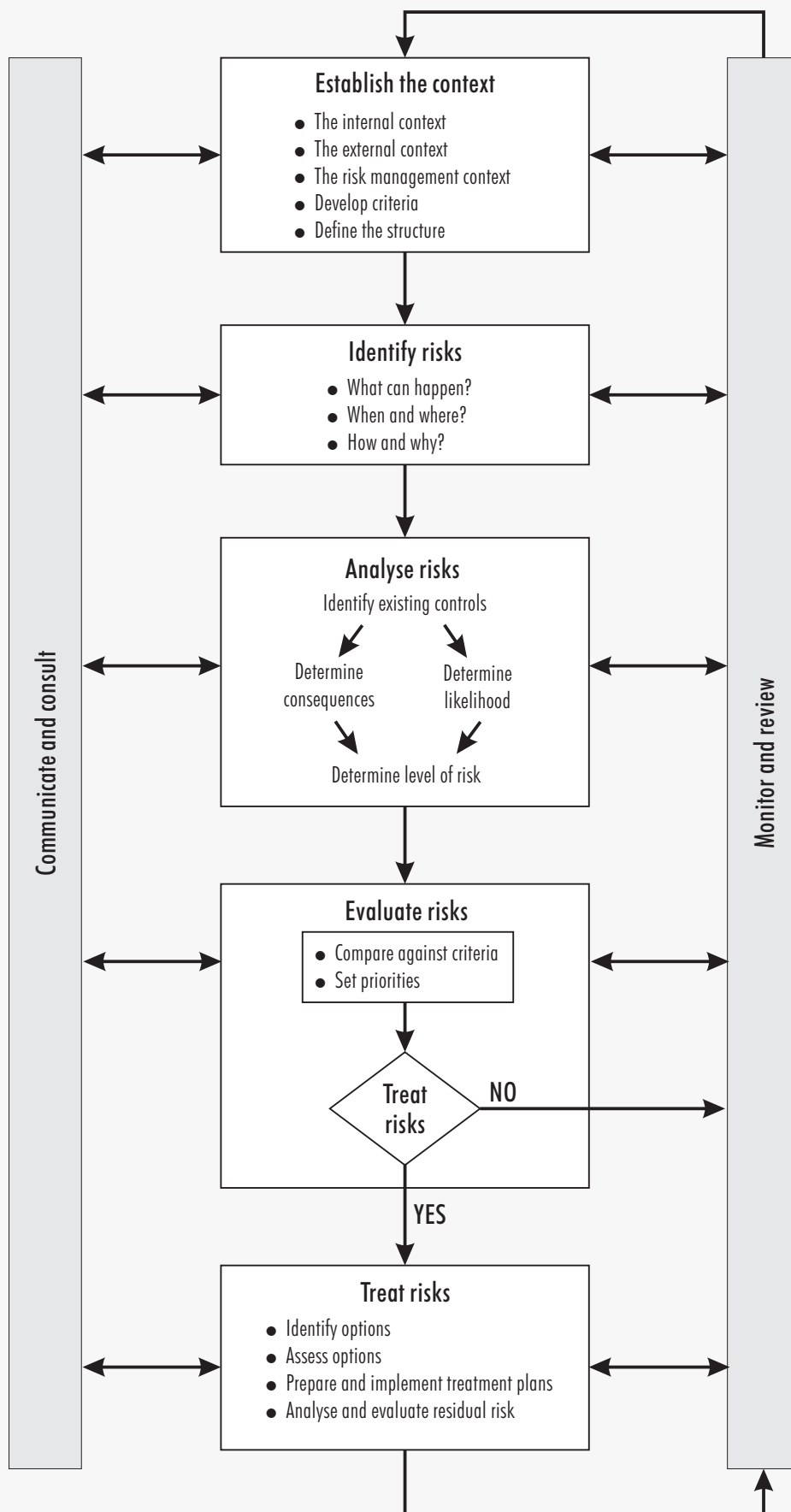
Department of Urban Affairs and Planning (DUAP) (1992a) *Guidelines for Hazard Analysis: Hazardous Industry Planning Advisory Paper No. 6.*

Department of Urban Affairs and Planning (DUAP) (1992b) *Risk Criteria for Land Use Safety Planning: Hazardous Industry Planning Advisory Paper No 4.*

Department of Urban Affairs and Planning (DUAP) (1999) *Multi-Level Risk Assessment.* Revised Edition.

Safe Production Solutions (2007) *Helensburgh Coal Pty Ltd Metropolitan Colliery Subsidence over Longwalls 18 to 19A Risk Assessment.* Prepared for HCPL.

FIGURES



Source: AS/NZS 4360: 2004 Risk Management

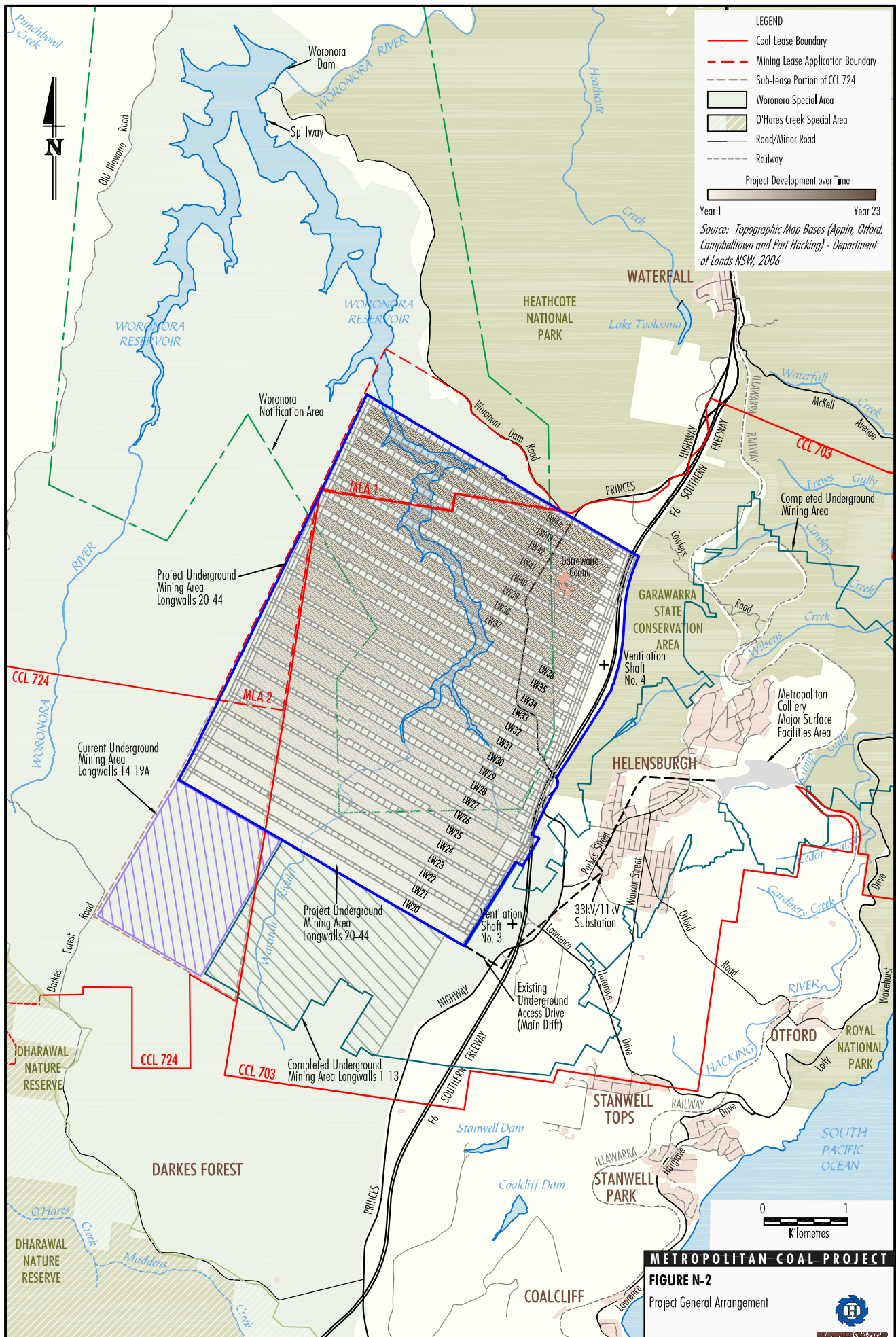
METROPOLITAN COAL PROJECT

FIGURE N-1

Risk Management Process



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ATTACHMENT NA

METROPOLITAN COAL PROJECT
HAZARD IDENTIFICATION TABLE

Metropolitan Coal Project Hazard Identification Table

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Transport to Site (Explosives, Fuels and Hydrocarbons, Chemicals and General Goods, Mobile and Fixed Plant, Construction Materials)	Leaks/Spills Fire/Explosion	Traffic accident resulting in leaks/spills of Fuels and Hydrocarbons, Chemicals and other Dangerous Goods.	<ul style="list-style-type: none"> • Surface Transport Management Plan. • Contractor Management Plan. • Spill Management Plan. • Bushfire Response Plan. • Fire and Explosion Control Management Plan. • Fire Fighting Capability Management Plan. • Licensed contractors in accordance with Australian Standards and NSW legislation. • Communications. • Explosives – storage license (storage license covers receipt of explosives and dangerous goods). • Fire fighting equipment on-board where required. • Spill kits on-board. 	D	4	21(L)
	Theft	Theft of vehicle transporting Dangerous Goods, Fuels and Hydrocarbons, Chemicals to site and malicious act resulting in injury to a member of the public.	<ul style="list-style-type: none"> • Surface Transport Management Plan. • Contractor Management Plan. • Site Security Plan. • Licensed contractors in accordance with Australian Standards and NSW legislation. • Communications – contact Police. • Probity check on contractors/drivers. • Explosives – storage license (storage license covers receipt of explosives and dangerous goods). • Separate transportation of explosives and detonators. 	E	2	16(L)
	Leaks/Spills	Poor maintenance causing leak/spill.	<ul style="list-style-type: none"> • Surface Transport Management Plan. • Contractor Management Plan. • Spill Management Plan. • Licensed contractors in accordance with Australian Standards and NSW legislation. • Communications. • Spill kits on-board. 	C	5	22(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
On-site Storage (Fuels and Hydrocarbons, Lubricants, Compressed Gases, Chemicals, Explosives and Water)	Explosion	Explosives magazine detonates by lightning strike, malicious act, or human error leading to off-site impacts.	<ul style="list-style-type: none"> • Surface Emergency Management Plan (including Emergency Services personnel). • Site Security Plan. • Bushfire Response Plan. • Fire and Explosion Control Management Plan. • Fire Fighting Capability Management Plan. • Explosive magazine complies with relevant Australian Standards and NSW legislation which includes consideration of impact on off-site structures/people. • Site Security Plan (Toolbox talks). • Lightning protection to Australian Standards. • Authorised personnel with appropriate licenses to handle explosives. • Separate storage of explosives and detonators. 	E	5	25(L)
	Explosion	Chemical/fuel/gas cylinders/oxy acetylene detonates by lightning strike, malicious act or human error leading to off-site impacts.	<ul style="list-style-type: none"> • Surface Emergency Management Plan (including Emergency Services personnel). • Site Security Plan (Toolbox talks). • Bushfire Response Plan. • Fire and Explosion Control Management Plan. • Fire Fighting Capability Management Plan. • Storage of Chemicals/fuel/gas cylinders/oxy acetylene complies with relevant Australian Standards and NSW legislation. 	D	5	24(L)
	Fire	Diesel/chemicals storage results in a fire leading to off-site bushfire.	<ul style="list-style-type: none"> • Surface Emergency Management Plan (including Emergency Services personnel). • Site Security Plan (Toolbox talks). • Fire and Explosion Control Management Plan. • Fire Fighting Capability Management Plan. • Bushfire Response Plan. • Communications – contact Rural Fire Service. • Regular inspections and maintenance where required. • Storage of Chemicals/fuel/gas cylinders/oxy acetylene complies with relevant Australian Standards and NSW legislation. 	E	2	16(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
On-site Storage (Fuels and Hydrocarbons, Lubricants, Compressed Gases, Chemicals, Explosives and Water) (Cont'd.)	Spills/Leaks	Failed tank or pipe leading to off-site impacts including chemical or fuel contamination.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Spill Management Plan. • Water Management Plan. • Design of structures/tanks/pipes to relevant Australian Standards and NSW legislation. • Bunding of storage facilities in accordance with Australian Standards. • Regular inspections and maintenance where required. 	E	4	23(L)
	Theft	Theft of dangerous goods or explosives and malicious act resulting in injury to a member of the public.	<ul style="list-style-type: none"> • Site Security Plan. • Surface Emergency Management Plan. • Storage of Chemicals/fuel/gas cylinders/oxy acetylene and explosives complies with relevant Australian Standards and NSW legislation. • Communications – contact Emergency Services (Police). • Regular Security Patrols. 	E	2	16(L)
Construction/ Development (Pit Top)	Spill/Leak	Spill of diesel, oils, lubricants, solvents or construction materials leading to impacts on nearby watercourses.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Contractor Management Plan. • Water Management Plan. • Spill Management Plan. • Fuel, oils and lubricants stored in accordance with Australian Standards and NSW legislation. • Spill response equipment and training. • Dangerous goods register (Materials Safety Data Sheets [MSDS]) (for each contractor). • Site construction runoff control (drains and sumps). • Existing site water management controls. • Construction specific environmental controls. 	E	4	23(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Construction/ Development (Pit Top) (Cont'd.)	Fire	Vehicle fire, fuel storage fire, electrical fire (power-up) resulting in off-site impacts.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Fire and Explosion Control Management Plan. • Fire Fighting Capability Management Plan. • Bushfire Response Plan. • Staff training (including drills) and induction. • WorkCover requirements (green card). • 'Hot work' permits. • Housekeeping activities - site would be kept clean and tidy and fire hazards removed where practicable. • Fire control equipment on site vehicles. • Rural Fire Service. 	E	2	16(L)
	Explosion	Explosion involving fuel, gas cylinders or oxy acetylene causing off-site impacts.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Fire and Explosion Control Management Plan. • Fire Fighting Capability Management Plan. • Bushfire Response Plan. • Fuel and gas cylinders stored in accordance with Australian Standards and NSW Legislation. • Rural Fire Service. 	D	5	24(L)
	Theft	Theft of construction materials and equipment leading to an off-site event causing injury.	<ul style="list-style-type: none"> • Site Security Plan. • Surface Emergency Management Plan. • Storage facilities designed to Australian Standards and NSW legislation – including security measures. • Restriction of access to storage areas, including securing storage facilities. • Provision of adequate lighting around storage facilities. • Police would be informed ASAP. 	E	4	23(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Construction/ Development (Remote Site)	Spill/Leak	Spill of diesel, oils, lubricants, solvents or construction materials leading to off-site impacts on nearby watercourses.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Spill Management Plan. • Fuel, oils and lubricants stored in accordance with Australian Standards and NSW Legislation. • Spill response equipment and training. • Dangerous goods register (MSDS) (for each contractor). • Site construction runoff control (drains and sumps). • Site specific environmental management plan. • Staff training and remote site induction. 	E	3	20(L)
	Fire	Vehicle fire, fuel storage fire, electrical fire (power-up) resulting in off-site impacts.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Fire and Explosion Control Management Plan. • Fire Fighting Capability Management Plan. • Bushfire Response Plan. • Fire control equipment on vehicles. • Staff training and remote site induction. • WorkCover requirements (green card). • 'Hot work' permits. • Housekeeping activities - site would be kept clean and tidy and fire hazards removed where practicable. • Rural Fire Service. 	E	2	16(L)
	Explosion	Explosion involving fuel, gas cylinders or oxy acetylene causing off-site impacts.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Bushfire Response Plan. • Fire and Explosion Control Management Plan. • Fire Fighting Capability Management Plan. • Fuel and gas cylinders stored in accordance with Australian Standards and NSW Legislation. • Rural Fire Service. • Staff training and remote site induction. 	E	2	16(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Construction/ Development (Remote Site) (Cont'd.)	Explosion	Construction blasting causing flyrock damaging property or persons off-site.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Contractor Management Plan. • Blasting undertaken by appropriate contractor. • Blast design appropriate for the situation. • Appropriate buffer distances, where practicable. • Adhere to RTA and Transgrid requirements. • Staff training and remote site induction. 	D	5	24(L)
	Theft	Theft of construction materials and equipment leading to an off-site event causing injury.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Site Security Plan. • Storage facilities designed to Australian Standards and NSW legislation – including security measures. • Restriction of access to storage areas, including securing storage facilities. • Provision of adequate lighting around storage facilities. • Communications – contact Police. • Staff training and remote site induction. 	E	4	23(L)
Underground Mining Operations	Fire	Malfunction of the methane flaring facility results in a fire off-site causing injury/impacts on the environment.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Underground Emergency Management Plan. • Fire and Explosion Control Management Plan. • Fire Fighting Capability Management Plan. • Bushfire Response Plan. • Flare facility designed by specialist flaring contractor in accordance with relevant Australian Standards. • Risk assessment conducted for flaring facility prior to works commencing. • Fire control equipment on vehicles. • Staff training and remote site induction. • Rural Fire Service. • Maintenance Plan - regular inspections. • Gas monitoring. 	E	2	16(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Underground Mining Operations (Cont'd.)	Release of Noxious Gases to Atmosphere	Emission from shafts/drift due to underground fire/explosion causing off-site impacts.	<ul style="list-style-type: none"> Underground Emergency Management Plan. Surface Emergency Management Plan. Fire and Explosion Control Management Plan. Fire Fighting Capability Management Plan. Bushfire Response Plan. Gas management and monitoring. Ventilation system (design and maintenance). Continuous monitoring of gas levels/alarm. <i>Coal Mine Health and Safety Act, 2002 and Coal Mine Health and Safety Regulation, 2006.</i> Gas drainage. 	D	4	21(L)
	Subsidence in excess of predictions and safety factors causing off-site impacts	<p>Significant loss of water from Woronora Reservoir to mine workings.</p> <p>Impacts in excess of predictions and safety factors on:</p> <ul style="list-style-type: none"> the F6 freeway; other roads; powerlines, tele-communications, water mains; the Garrawarra Aged Care Facility; or the Illawarra Railway; <p>causing impacts on people and/or property off-site.</p>	<ul style="list-style-type: none"> Subsidence Management Plan (SMP). Specialist subsidence engineers develop predictions based on upper bound prediction methodology. Monitoring of subsidence impacts from existing mining on an on-going basis. Monitoring of specific infrastructure items. Consideration of other colliery's experience on South Coast. Dams Safety Committee approval. Roads and Traffic Authority and Rail Infrastructure Corporation requirements. Modification of extraction geometry. Specialist investigations (e.g. surface water, groundwater, bridges, freeway pavement). Mitigation of existing infrastructure to account for subsidence. Coal Mine Safety Legislation. Mines Subsidence Act. Dams Safety Act – Inundation Plan. 	E	2	16(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Coal Handling and Preparation (Stockpiles)	Equipment Malfunction	Malfunction of dust suppression measures combined with unfavourable weather conditions leading to plume of dust travelling off-site.	<ul style="list-style-type: none"> Erosion and Sediment Control Plan. Stockpile Management Plan. Maintenance of dust suppression equipment. Regular inspections. Use of alternative dust suppression measures (water carts). 	C	5	22(L)
	Leaks/Spills	Unplanned off-site discharge of coal or coal reject.	<ul style="list-style-type: none"> Stockpile Management Plan. Waste Management Plan. Design to appropriate standards/legislation. Downstream containment ponds. Regular inspections and maintenance. Bunds to be designed to divert spills to containment structures. Spill response procedure. Staff training and induction. 	E	5	25(L)
	Fire/Explosion	Mobile plant, fixed plant, human action, powerlines, vehicle fire or fuel storage fire or spontaneous combustion leading to off-site fire related impacts.	<ul style="list-style-type: none"> Stockpile Management Plan. Surface Emergency Management Plan. Dust Explosion Management Plan. Bushfire Response Plan. Fire and Explosion Control Management Plan. Fire Fighting Capability Management Plan. Low potential due to known coal type (based on typical Southern Coalfield coal). Appropriate stockpile management. Availability of dozer for rapid stockpile management. Staff training and induction. Communications - contact Emergency Services (Fire). 	E	2	16(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Product Coal Transport (Road)	Spill/Leak	Poor maintenance, poor design, collision or human error leading to off-site impacts.	<ul style="list-style-type: none"> Contractor Management Plan. Surface Emergency Management Plan. Surface Transport Management Plan. Spill Management Plan. Licensed contractors in accordance with Australian Standards and NSW legislation. Site policies, management plans and procedures. Development of operating procedures and training to minimise the potential for overloading. Regular inspection of truck/train loading activities and rail infrastructure and intervention/maintenance where required. Operator training. Spill response procedures. Site Incident Report. Contractor Incident Investigation. Communications - contact Emergency Services. 	C	5	22(L)
	Fire/Explosion	Poor maintenance, poor design, collision, human error or spontaneous combustion leading to off-site fire/explosion impacts.	<ul style="list-style-type: none"> Contractor Management Plan. Surface Emergency Management Plan. Surface Transport Management Plan. Fire and Explosion Control Management Plan. Fire Fighting Capability Management Plan. Bushfire Response Plan. Licensed contractors in accordance with Australian Standards and NSW legislation. Site policies, management plans and procedures. Operator training. Spill response procedures. Site Incident Report. Contractor Incident Investigation. Communications - contact Emergency Services. 	D	4	21(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Coal Reject Transport	Spill/Leak	Poor maintenance, poor design, collision or human error leading to off-site impacts.	<ul style="list-style-type: none"> Contractor Management Plan. Surface Emergency Management Plan. Surface Transport Management Plan. Spill Management Plan. Waste Management Plan. Licensed contractors in accordance with Australian Standards and NSW legislation. Site policies, management plans and procedures. Development of operating procedures and training to minimise the potential for overloading. Regular inspection of truck loading activities and intervention/maintenance where required. Operator training. Spill response procedures. Site Incident Report. Contractor Incident Investigation. Communications - contact Emergency Services. 	C	5	22(L)
	Fire/Explosion	Poor maintenance, poor design, collision, human error or spontaneous combustion leading to off-site fire/explosion impacts.	<ul style="list-style-type: none"> Contractor Management Plan. Surface Emergency Management Plan. Surface Transport Management Plan. Waste Management Plan. Fire and Explosion Control Management Plan. Fire Fighting Capability Management Plan. Bushfire Response Plan. Licensed contractors in accordance with Australian Standards and NSW legislation. Site policies, management plans and procedures. Operator training. Spill response procedures. Site Incident Report. Contractor Incident Investigation. Communications - contact Emergency Services. 	D	4	21(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Product Coal Transport (Rail)	Spill/Leak	Overloading, poor maintenance, door failure, poor design, collision or human error leading to off-site impacts.	<ul style="list-style-type: none"> Contractor Management Plan. Surface Emergency Management Plan. Surface Transport Management Plan. Spill Management Plan. RailCorp requirements and procedures. Signalling and speed restrictions on rail line. Licensed contractors in accordance with Australian Standards and NSW legislation. Site policies, management plans and procedures. Development of operating procedures and training to minimise the potential for overloading. Regular inspection of rail infrastructure and intervention/maintenance where required. Operator training. Spill response procedures. Site Incident Report. Contractor Incident Investigation. Communications - contact Emergency Services. 	C	4	18(L)
	Fire/Explosion	Poor maintenance, poor design, collision, human error or spontaneous combustion leading to off-site fire/explosion impacts.	<ul style="list-style-type: none"> Contractor Management Plan. Surface Emergency Management Plan. Surface Transport Management Plan. Fire and Explosion Control Management Plan. Fire Fighting Capability Management Plan. Bushfire Response Plan. Licensed contractors in accordance with Australian Standards and NSW legislation. Signalling and speed restrictions on rail line. Site policies, management plans and procedures. 			

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Product Coal Transport (Rail) (Cont'd.)	Fire/Explosion	Poor maintenance, poor design, collision, human error or spontaneous combustion leading to off-site fire/explosion impacts.	<ul style="list-style-type: none"> Operator training. Spill response procedures. Site Incident Report. Contractor Incident Investigation. Communications - contact Emergency Services (fire). 	E	4	23(L)
Water Management	Spill/Leak	Failure of turkey's nest dam wall leading to spill impacts off-site.	<ul style="list-style-type: none"> Water Management Plan. Spill Management Plan. Surface Emergency Management Plan. Designed by specialist consultant to appropriate standards. Regular inspections and maintenance. 	C	4	18(L)
	Spill/Leak	Failure of water treatment plant and large rainfall event resulting in spill to Camp Creek.	<ul style="list-style-type: none"> Water Management Plan. Spill Management Plan. Surface Emergency Management Plan. Regular inspections and maintenance. Operator training. Real-time monitoring water reticulation and quality. Environment Protection Licence requirements. 	D	3	17(L)
Exploration/Monitoring Activities	Spill/Leak	Vandalism leads to off-site impacts.	<ul style="list-style-type: none"> Site Security Plan. Public access to the Woronora Special Area is restricted and managed by the SCA. The Woronora Special Area would be accessed via two locked gates from the Princes Highway. All gates will be kept closed and locked at all times. Regular inspections. Inspection of Special Area by SCA rangers. Use of suitably qualified or trained personnel. 	D	4	21(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Exploration/Monitoring Activities (Cont'd.)	Spill/Leak	Failure of environmental controls leading to off-site impacts.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Erosion and Sediment Control Plan. • Spill Management Plan. • Experienced/trained drilling contractors. • Off-site inductions. • Installation and maintenance of appropriate erosion and sediment control measures. • Regular inspections of erosion and sediment control structures for structural integrity, effectiveness and for maintenance as necessary to maintain their function. • Managing the use of fuels, oils, etc. to minimise the risk of spills or leaks which could cause water contamination (e.g. use of bunding, regular inspection of equipment for leaks of oil/fuel/coolant, the provision of spill containment/treatment resources and training of personnel in their use). • The use of a daily inspection and reporting system during monitoring equipment installation to check that all controls are in place and working effectively. • Rehabilitation of surface disturbance areas would be carried out to the satisfaction of the SCA. 	D	4	21(L)
	Fire/Explosion	Vehicle fire, fuel storage fire, electrical fire resulting in off-site impacts.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Fire and Explosion Control Management Plan. • Fire Fighting Capability Management Plan. • Bushfire Response Plan. • Fire control equipment on vehicles. • Staff training and remote site induction. • 'Hot work' permits. • Housekeeping activities - site would be kept clean and tidy and fire hazards removed where practicable. • Rural Fire Service. 	E	2	16(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Rehabilitation and Remediation Works (Remote Site)	Spill/Leak	Transport collision leading to off-site impacts.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Surface Transport Management Plan. • SCA requirements for undertaking activities in the Special Area. • Vehicle movements would be kept to the minimum necessary. • Vehicles would be required to observe the 40 kilometre (km)/hour speed limit on roads in the catchment area. • The catchment area would be accessed via two locked gates from the Princes Highway. • Access to the catchment area would not occur after 10 millimetres (mm) of rain has been received in any 24 hour period, until such times as the access can occur without causing damage to fire roads (with the exception of access for monitoring purposes). • All gates to the catchment area would be kept closed and locked at all times. • Hazardous materials (fuel, oil, etc.) would not be transported in the area unless they are transported within the confines of an adequately bunded container and they are sealed of any possible leakage points. • Vehicles would not be used in the catchment unless they have been serviced and maintained to an acceptable standard. • Vehicles would not be operated if they are known to have a defect that may affect safe operation. • Staff training and remote site induction. • The maintenance of a reliable system of communication to enable accidents to be reported. • Spill containment/treatment resources (i.e. spill kits) would be provided and personnel will be trained in their use. 	D	4	21(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Rehabilitation and Remediation Works (Remote Site) (Cont'd.)	Spill/Leak	Failure of pumping systems/hoses leading to off-site impacts.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • SCA Requirements for undertaking activities in the Special Area. • Use of suitably qualified or trained personnel. • Daily inspection and reporting system during rehabilitation and remediation works to check that all controls are in place and working effectively. • Appropriate erosion and sediment control measures to minimise the potential for sedimentation in accordance with relevant guidelines. • Regular inspection of equipment (e.g. drill rigs, compressors, pumps) for leaks of oil/fuel/coolant. • The use of oil/fuel absorbent material or containment methods to prevent or minimise contact with the surrounding environment. • Provision of spill containment/treatment resources (i.e. spill kits) and training of personnel in their use. 	D	4	21(L)
	Spill/Leak	Vandalism and malicious acts leading to off-site impacts.	<ul style="list-style-type: none"> • Public access to the Woronora Special Area is restricted and managed by the SCA. • The Woronora Special Area would be accessed via two locked gates from the Princes Highway. All gates will be kept closed and locked at all times. • Roll-up hoses at end of day. • Regular inspections. • Inspections of Special Area by SCA rangers. • Use of suitably qualified or trained personnel. 	D	4	21(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Rehabilitation and Remediation Works (Remote Site) (Cont'd.)	Fire/Explosion	Vehicle fire, fuel storage fire, electrical fire resulting in off-site impacts.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Fire and Explosion Control Management Plan. • Fire Fighting Capability Management Plan. • Bushfire Response Plan. • Fire control equipment on vehicles. • Staff training and remote site induction. • 'Hot work' permits. • Housekeeping activities - site would be kept clean and tidy and fire hazards removed where practicable. • Rural Fire Service. 	E	2	16(L)
Other Infrastructure and Supporting Systems	Spills/Leaks	Spill of diesel, oils, lubricants, solvents, sewage wastes or domestic wastes leading to impacts on nearby watercourses.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Contractor Management Plan. • Waste Management Plan. • Spill Management Plan. • A licensed contractor would remove sewage from the underground operations for disposal. • Waste oil is collected by a licensed contractor for off-site disposal. • All domestic waste and recyclable products would be collected weekly by a licensed waste contractor. • Waste batteries and scrap metal disposed of in accordance with Waste Management Plan. • Licensed contractors in accordance with Australian Standards and NSW legislation. • Regular inspections and maintenance where required. • Site policies, management plans and procedures. 	D	4	21(L)

Metropolitan Coal Project Hazard Identification Table (Continued)

Project Component	Incident Type	Scenario	Proposed Treatment Measures	Likelihood ¹	Consequence ²	Risk ³
Other Infrastructure and Supporting Systems (Cont.)	Fire	Malfunction of power substation results in off-site fire.	<ul style="list-style-type: none"> • Surface Emergency Management Plan. • Contractor Management Plan. • Fire and Explosion Control Management Plan. • Fire Fighting Capability Management Plan. • Bushfire Response Plan. • Appropriate design to relevant standards. • Fire control equipment at site. • Staff training and remote site induction. • Housekeeping activities - site would be kept clean and tidy and fire hazards removed where practicable. • Surface Emergency Management Plan. • Rural Fire Service. • Power usage monitoring and alarms. • Communications - contact Emergency services (fire). 	E	2	16(L)

1 Refer to Table N-1

2 Refer to Table N-2

3 Refer to Table N-3